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FINAL REPORT
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IDENTIFYING RESOURCE ATTRIBUTES PROVIDING OPPORTUNITIES FOR DISPERSED RECREATION

Submitted to
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Problem

The Resources Planning Act (RPA) requires the U.S. Forest Service to conduct a periodic assessment of the productivity potential of the Nation's forest and rangelands. One area of assessment is outdoor recreational and wilderness resources. Within this area, little study has been made of the capability of forest and rangeland resources to meet dispersed recreation needs.

A few fairly site specific recreation research inventory techniques have been developed, but these seem unsuited to the regional scale assessment problem posed by the RPA. Also, each of these techniques has some readily apparent weakness for site specific inventory problems.

In view of the RPA needs and the problems inherent in the existing inventory and assessment procedures, there is a need to develop a more applicable recreation resource inventory and assessment technique. Therefore, the research problem of this study was to begin development of such procedures for dispersed forms of outdoor recreation. The approach taken focused on consumers of outdoor recreation opportunities. This approach fits well the goal of managing outdoor recreation resources to provide satisfying outdoor recreation opportunities for forest and rangeland users.

This study did not, by itself, solve the problem. It is one activity among several activities on forest and rangelands sponsored by the RPA research effort, the McIntire-Stennis forestry research program, the Bureau of Land Management, and non-RPA units of the Forest Service which are focusing on this and other components of the solution.

Justification

Historically, natural resources planners and managers have examined specific sites and made intuitive judgments about each site's capability to produce a specific recreation opportunity--either for a developed or dispersed activity. While such a system has sometimes worked well in the past, it is certainly insufficient for assessing the potentials of the entire Nation's forest and rangeland resources. Additionally, some managers have become interested in managing natural resources to produce opportunities for specific kinds of quality recreational experiences. But, they have no way of knowing which resource factors are perceived by users as essential for a satisfying (quality) experience.

One way to approach solution of these two problems is to identify the resource attributes which are necessary to produce different recreation opportunities. With knowledge of which attributes are important for each kind of experience demanded, resource assessment can take place through inventory and analysis of the relevant resource characteristics. With the same information, the manager will know which resource attributes to manipulate to produce desired opportunities.

While there is some need to identify resource attributes necessary for producing developed recreation opportunities, the urgency for determining these attributes for dispersed activities is much greater. Recreational use of forest and other wildlands has increased steadily during the past decade. At least 75 percent of this increased use has been of a dispersed nature. Large increases in wilderness and backcountry hiking and camping, in snowmobiling, cross-country skiing, and jeeping are all indicative of the trend toward dispersed use. Also, dispersed use has traditionally been

ignored in assessment of recreation opportunities. The vastness of the resource base and the low capital investment in facilities for this type of use have likely contributed to the past lack of concern. However, changes have now necessitated a concern for the dispersed recreation resource. Increasing use of the resource, increasing demand for other forest products, and the needs expressed in the RPA indicate that action is needed.

Objectives

In order to begin solution of the problem of developing a technique for RPA assessment of dispersed outdoor recreation resources, two study objectives were set forth. They were:

(1) To develop techniques and determine resource attributes necessary for inventory and analysis in assessment of dispersed outdoor recreation opportunities on forest and rangelands;

(2) To identify the resource attributes producing dispersed outdoor recreation opportunities in the Indian Peaks area of the Roosevelt National Forest.

In addition to meeting these two objectives, additional information was obtained during the study process. Specifically, use rates and patterns of use were measured and are reported in this final report.

Study Area

The study area is commonly known as the Indian Peaks (Figure 1). It lies along the spine of the Continental Divide, immediately south of Rocky Mountain National Park in north central Colorado. The Indian Peaks is a

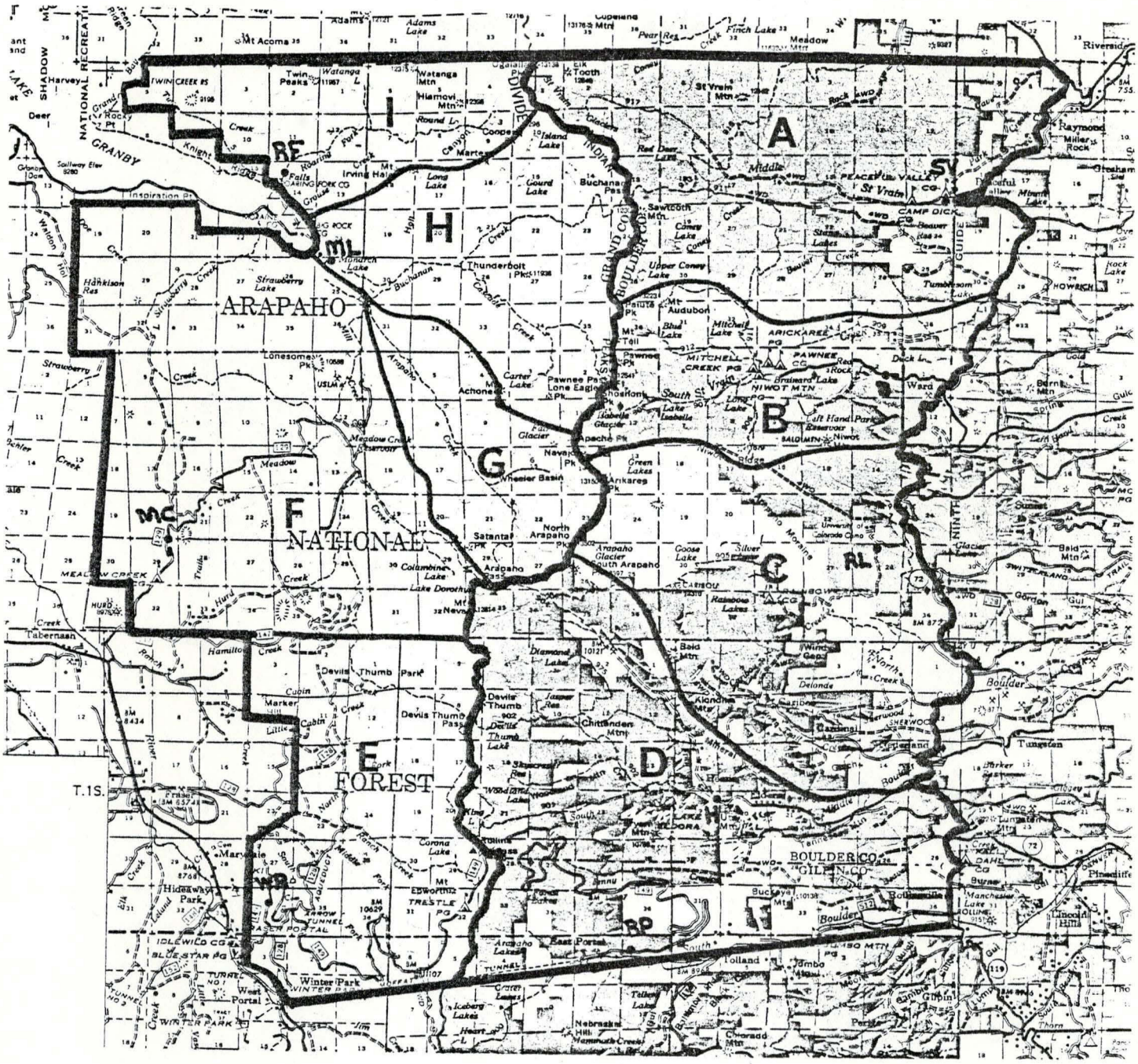

Figure 1. Indian Peaks Study Area with zones and contact stations identified.

backcountry area being managed to preserve its wilderness character while wilderness classification study is taking place, as directed by the U.S. Congress.

The area is accessible from the east by paved highway from the Colorado Front Range cities including Denver, Boulder, and Fort Collins. There are six primary entrances to the area from the east: Allenspark and Rock Creek; Peaceful Valley and the Middle Fork of the St. Vrain River; Brainard Lake and associated recreational complex; Rainbow Lakes; Hessie; Rollins Pass roadway. These entrances make the area accessible along a 20-mile front running from north to south. Access is also possible from the west at four primary entrances: Rollins Pass Roadway; Meadow Creek; Monarch Lake; Roaring Fork. Many area users cross the Continental Divide while recreating in the area.

Main features of the area are the Indian Peaks and many backcountry lakes. Like many high mountain areas in the central Rockies, the area contains dense forests, open meadows, numerous lakes, and peaks jutting to the sky. The landscape is diverse and presents an interesting mosaic to the high mountain traveler.

Heavy use of the area is made by packpackers in the summer. Much lighter use, cross-country skiing and snowmobiling, occurs during winter. Uses cover the range of dispersed activities including hiking, nature study, backcountry camping, fishing, and cross-country skiing. Use is distributed unevenly throughout the area with Brainard Lake, Hessie, and Rollins Pass Road being primary access points.

For estimating use, the Indian Peaks study area was divided into zones based upon topography, roughly approximating the major watersheds in the

area. Nine zones were identified, four to the east side of the Continental Divide and five to the west side. The zones A through I are identified by bold, capital letters on Figure 1. Within each zone there is a user contact station identified by a small capital letter.

Procedures

This section describes the procedures of the Indian Peaks Study. It is divided into three parts: the front-end interview, the backcountry contacts, and the mail questionnaire. The front-end interview was utilized when contacting recreationists leaving the study area. This provided the basic visitor use data and a sample pool for the mail questionnaire. The backcountry contacts involved observation of and informal "rapping" with visitors in order to get their insights and impressions of the study area and their recreational experience. The mail questionnaire was used to examine the users' preferences for the physical resource attributes of the Indian Peaks backcountry.

Front-end Interview

The front-end interview provided visitor use data in the study area and a sample frame of users' names and addresses. A one-page questionnaire was completed by a trained interviewer (Appendix A). Contacts were initially screened to determine if they were on a recreation excursion. For those recreating, information was gathered concerning activities they engaged in plus time and location of engagement, origin of trip, previous visits in past 12 months, and name and address. Observation was made of the vehicle type, number of people in the party, and age and sex classes of party members.

The procedure for contacting users was to roadblock at predetermined times and actually stop users as they exited the area. Forest survey and stop signs were used in this procedure with the interviewer location at the stop sign. When a vehicle approached, the driver was signalled to stop, and either the driver or passenger was asked to cooperate with the survey and to supply his name and address for a follow-up questionnaire. An attempt was made to shift the interviewing back and forth from the driver to the passenger(s) in order to obtain a more representative listing of area users.

Sampling Plan

The design of the sampling plan was based on historical visitor use data obtained from the Boulder and Hot Sulphur Springs district offices of the U.S. Forest Service. These data were used to indicate how much interviewing time should be allocated to each interview site. For example, historical use data indicated that one-third of the east-side Indian Peaks recreation use occurred in the Brainard Lake area, hence it was planned that one-third of the interviewing effort was to be at the Brainard Lake interview station. The intent was to get a proportionate representative sample of recreation visitors to the Indian Peaks backcountry area.

In addition to the sampling intensity differing among stations, interview periods were also divided by weekend versus weekday and by a 9-12/2-5 hour shift versus an 11-2/4-7 hour shift. This also was done in an attempt to get a representative sample of Indian Peaks users. Table 1 indicates the number of hours which were spent at each interview station and whether this number was over or under the historic proportion relative to use at the Brainard Lake Station.

Table 1. Number of hours of interviewing at each station and an indication of whether this number is over or under the historic proportion relative to use at the Brainard Lake station.

Station	Hours of Interviewing[a]	Under or Over Interviewing
Saint Vrain	36.75	
Brainard Lakes	104.25	
Rainbow Lakes	35.25	
Hessie	57.75	
East Rollins Pass	77.00	
West Rollins Pass	21.50	Over
Meadow Creek	11.75	Under
Monarch Lake	27.00	Under
Roaring Fork	12.50	Under

[a]The 1976 summer interviewing period was July 2 through September 6 for West Rollins Pass, Monarch Lake, Meadow Creek, and Roaring Fork. For the remaining areas, the interviewing period was June 19 through September 6.

Estimating Use

To estimate use for each area, the following equation was employed:

$$ERU = [RI + (EV \times PR)] \times \left(\frac{EH}{IH}\right) \times U$$

where,

ERU = Estimated recreation use (number of parties)

RI = Number of recreation interviews

EV = Number of vehicles exiting that were not stopped for interviewing during interviewing hours

PR = Proportion of interviews that were of recreationists (.95)

EH = Number of hours during a day that recreationists can be expected to leave the area (12 hours)

IH = Number of hours of actual interviewing

U = Adjustment factor to bring estimated use to historic use proportion (West Rollins Pass 0.68, Meadow Creek 1.28, Monarch Lake 1.44, Roaring Fork 1.15)

Utilization of this equation yielded an estimate of the total use of the Indian Peaks for the period June 15 to September 6. The use estimation is given in the results section.

Traffic counters were also used in the study. Conceptually, traffic count data can provide the number of vehicles entering a zone and can be combined with interview data to estimate the percentage of traffic of a particular nature. For example, if a road counter at a station tallied 10,000 vehicles in July, and from interviewing it was known that 30 percent of the interviewees participated in hiking, it could then be estimated that the occupants of 3,000 cars participated in hiking. This process is commonly called double-sampling (once by counter, once by interviewer).

Unfortunately, the road count data collected in the Indian Peaks were not reliable enough to implement this procedure. The accurate functioning of the road counters was sporadic throughout the summer.

Backcountry Contacts

Backcountry contacts were made by trained participant observers. The intent of these contacts and observations was to obtain behavioral and opinion information from area users in such a manner that they did not know they were participating in research.

The procedure for contacting users was simply to engage in conversation with users along trails, at campsites, along lakes, or wherever they were met. The interviewer was assigned an area in which to roam. If a user did not wish to converse, the participant observer did not persist. After conversing, the participant observer recorded pertinent information on a question-check sheet which was kept in his backpack (Appendix B). This was done as soon after terminating the conversation as possible to avoid information loss.

Trips were planned using two participant observers traveling together in the backcountry for no more than two days. Table 2 shows that 194 contacts were made during the 24-man days spent in the various zones of the Indian Peaks backcountry area.

Mail Questionnaire

A mail questionnaire was developed in the Fall, 1977. There were three basic sections: 7 questions concerning a user's trip into the Indian Peaks backcountry area, 73 physical resource attributes, and 6 socioeconomic questions (Appendix C).

The 73 physical resource attributes were compiled through various means. The primary source was from the firsthand experience of the backcountry participant observers and the information recorded on the backcountry forms. In addition, photos of the area were viewed, Forest Service officials were questioned, and related Forest Service documents were reviewed. Table 3 lists the physical resource attributes. The 73 items were randomly arranged and positioned on a 9-point scale in which a respondent would indicate how much the attribute added to or detracted from his satisfaction.

Since the Indian Peaks backcountry area has no defined boundary, a criterion was established to select which users should receive a questionnaire. Working on the assumption that many of the front-end contacts did not actually travel into the backcountry (i.e., car sightseers, established campground or picnic users), the criterion for possible selection was that they had to participate in hiking for more than three hours. The assumption was that any person who hiked more than three hours did travel into the backcountry area and could relate to the physical resource attributes listed in the questionnaire.

Table 2. Dates of backcountry trips, number of contacts, and location of trips.

Dates		Number of Contacts	Zone
July	1 - 2	49	B
	3 - 4	24	D
	10 - 11	36	B/H
	17	10	F
	18	10	H
	23	10	H
	25	8	H
August	7 - 8	8	B
	14 - 15	5	B
	22 - 23	9	I
	23 - 24	2	A
	28 - 29	4	H
September	4 - 5	11	B
	11 - 12	8	H
Totals	24 days	194	

Table 3. Selected physical resource attributes.

1) clean fresh air
2) rainy weather
3) wide view of the terrain
4) mule deer
5) large roaring streams
6) meadows among the forest
7) ptarmigan
8) song birds
9) lake views
10) mature virgin forests
11) stocked fish
12) snow capped mountains
13) vast areas with no designated trails
14) alpine meadows
15) elk
16) unusually shaped rocks
17) a variety of different sized streams
18) fossil outcrops
19) naturally reproducing fish populations
20) mountain springs
21) wind sculptured rocks
22) caves
23) brook trout
24) easily obtained firewood
25) rare plants
26) scenic overlook
27) brown trout
28) slow moving streams with deep holes
29) rugged terrain
30) beaver dams and ponds
31) snowfields
32) isolated lakes
33) rainbow trout
34) rock towers
35) bears
36) murky or discolored water
37) wildflowers in bloom
38) diverse scenery
39) few evidences of where others have been
40) cutthroat trout
41) insects that bite
42) big horned sheep
43) hot springs
44) grayling
45) small streams you can step across
46) boulder fields
47) steep terrain areas
48) areas above timberline
49) Indian artifacts
50) steep gorges
51) glaciers
52) squirrels
53) grouse
54) hikeable ridgetops
55) aspen groves
56) evidence of logging activity
57) waterfalls
58) a variety of rock types and minerals
59) abundant sources of water
60) dense stands of pines
61) drinkable mountain water
62) evidence of mining activity
63) areas with dense vegetation
64) small furbearers
65) streams with many fly hatches
66) marshes
67) steep terrain
68) streams lined with brush
69) predatory birds such as owls and hawks
70) reservoirs in the backcountry
71) rock outcroppings
72) shaded areas without underbrush
73) columbines

Of the 2,602 front-end contacts, a subsample was identified based on the above criterion, from which 390 were randomly selected to receive the questionnaire.

The first mailing of the questionnaire was on December 27, 1976. Within three weeks, 236 usable questionnaires were returned. A second mailing on January 24, 1977 brought the total to 286 usable questionnaires. The effective return was 73 percent.

Data Analysis

Data from the front-end interview and mail questionnaire were key-punched and processed through the Colorado State University CDC-6400 computer. The Statistical Package for the Social Sciences program (SPSS) and the BC-TRY Cluster Analytic Program (Tryon and Bailey, 1970) were the primary analytical tool.

Several subroutines of the SPSS program were used on the front-end interview data, as well as on the trip description and socioeconomic data from the mail questionnaire. Cluster analysis was implemented on the physical resource attributes in order to cluster those attributes which were responded to similarly and have a common theme.

Due to the informal structure of the backcountry contacts, these data were not computer analyzed. All forms were reviewed to validate data collected by the front-end interview. And as mentioned previously, the backcountry contact data added considerable guidance to formulating the content of the mail questionnaire.

Results

The procedure used to gather use data and to collect information on desirable resource attributes is one that has been used in other studies to gather information regarding the types of satisfaction that users desire from backcountry and wilderness recreation experiences. It consisted of stopping area users as they left the area and collecting use data and obtaining names and addresses from them. A follow-up questionnaire was sent to a sample of users to gather information about desirable resource attributes. While no objective criteria were employed to evaluate the effectiveness of this technique, it did produce the kind of information needed to meet the objectives and thus can be considered applicable to the problem.

Use Data

The use data reported below are from summarizations of the items on the front-end questionnaire and from using the equation given in the procedures section for estimating area use. Tables 4 through 9 refer to the data collected from respondents while Tables 10 through 14 are estimates of total summer use.

Table 4 shows the distribution of respondents who were in the Indian Peaks area for recreation, traveling to or from recreation, or a non-recreation reason. Over 94 percent of the contacted parties were in the area for recreation.

Table 4. Responses to "Purpose of Trip."

Purpose	Frequency	Percentage
Recreation	2423	94.3
To-From Recreation	26	1.0
Non-recreation	120	4.7

Table 5 indicates the number of previous visits the respondents had to the study area within the past 12 months for any type of recreation. Approximately one out of every two parties had not visited the area within the past 12 months for any type of recreation

Table 5. Number of previous visits to area within past 12 months for any type of recreation.

Previous Visits	Frequency	Percentage
This is first	1250	51.0
1	409	16.7
2-3	383	15.6
4-6	233	9.5
7-10	46	1.9
10 or more	130	5.3

Table 6 shows that over 96 percent of the contacted parties had begun their trip from outside of the study area. Due to the positioning of the interview stations, few private homes or businesses were within the study area.

Table 6. Responses to "Was the origin of trip within the study area."

Response	Frequency	Percentage
Yes	90	3.6
No	2425	96.4

Table 7 indicates that over 62 percent of the respondents were using cars when visiting the area. Very few contacts were made with motorcyclists (.6 percent) and trailer users (.3 percent).

Table 7. Type of vehicles used to visit Indian Peaks.

Vehicle	Frequency	Percentage
Car	1545	62.8
Truck	238	9.0
Trailer	8	.3
Van	167	6.4
Camper	129	5.0
Motorcycle	14	.6
Motor Home	33	1.3
4-Wheel	299	12.1
Other	28	1.1

Table 8 shows that approximately 73 percent of the contacted parties had two, three, or four people in their party. Relative to the entire sample, parties with more than seven people were few (3.6 percent).

Table 8. Size of contacted parties.

Number of People	Frequency	Percentage
1	289	11.5
2	1037	41.2
3	393	15.6
4	401	15.9
5	187	7.4
6	120	4.8
7	40	1.6
8	24	1.0
9 or more	27	1.0

Table 9 describes the contacted parties by age and sex. For example, 627 parties had at least one male under 15 years of age. Not displayed in the table is that some of the 627 parties may have had more than one male under 15 years of age. Males between 21-45 years of age were represented in most (82.8 percent) of the parties, followed by females in the same age bracket (54.1 percent of the parties).

Table 9. Contacts by age and sex.

Age	Sex	Frequency	Percentage (N=2602)
Under 15	Male	627	24.1
	Female	438	16.8
16-20	Male	242	9.3
	Female	163	6.3
21-45	Male	1894	82.8
	Female	1407	54.1
Older than 45	Male	480	18.4
	Female	413	15.9

The estimated recreation use level for the total area and each contact station is shown in Table 10. Included are the number of recreation parties, average number of recreation parties per day, total number of visitors for the summer season, and the average number of visitors per day (percentages are given in parentheses). It is clear from these data that Brainard Lake produces the greatest visitation for the area. Hessie, St. Vrain, and East Rollins Pass were next in vistation population. West Rollins Pass was most important among west-side contact stations.

Table 11 shows the estimated frequency distribution of participation in selected recreation activities. These estimates are based upon the participation rates of the 2,602 interviewed parties multipled by the

Table 10. Estimated Indian Peaks use by contact station (percentage in parentheses).

Areas	ESTIMATED			
	Number of Recreation Parties	Average Number of Rec. Parties/Day[a]	Total Number of Vistiors During Summer[b]	Average Number of Visitors/Day
St. Vrain	8,450 (11)	103 (11)	24,500 (11)	299 (11)
Brainard	32,550 (44)	397 (43)	94,400 (44)	1,151 (43)
Rainbow Lakes	7,000 (9)	85 (9)	20,300 (9)	248 (9)
Hessie	8,750 (12)	107 (11)	25,400 (12)	309 (11)
East Rollins Pass	8,000 (11)	98 (11)	23,200 (11)	283 (11)
West Rollins Pass	5,800 (8)	85 (9)	16,800 (8)	247 (9)
Monarch Lake	2,950 (4)	43 (5)	8,600 (4)	126 (5)
Meadow Creek	600 (1)	9 (1)	1,740 (1)	26 (1)
Roaring Fork	250 (-)	4 (-)	725 (-)	11 (-)
Entire Indian Peaks Area	74,350	931	215,665	2,700

[a]The 1976 summer season was July 2 through September 6 for West Rollins Pass, Monarch Lake, Meadow Creek, and Roaring Fork. June 19 through September 6 was the summer season for the remaining areas.

[b]The average party size was 2.89 visitors.

Table 11. Estimated frequency distribution of number of people participating in selected activities by area.

Activity	Total Indian Peaks Area	AREA[a]						
		Saint Vrain	Brainard Lake	Rainbow Lakes	Hessie	East Rollins Pass	West Rollins Pass	Monarch Lake
Boating	717	--	717	--	--	--	--	--
Camping Near Auto	29,917	9,745	9,759	4,508	2,032	1,679	2,194	--
Camping Away From Auto	27,663	1,569	7,248	2,925	5,107	2,136	1,566	6,268
Fishing	53,607	4,818	26,623	4,962	3,690	6,560	1,878	3,760
Picnicking	25,724	3,922	13,563	2,436	1,601	1,298	2,037	251
Auto Driving	64,294	5,266	22,819	4,997	4,861	13,505	12,843	--
4-Wheel Driving	7,442	3,696	358	852	370	1,069	1,095	--
Motorcycling	2,676	448	431	610	185	535	471	--
Bicycling	468	335	72	--	61	--	--	--
Gathering For. Products	8,705	1,009	789	731	185	381	471	5,141
Hiking/Walking	96,265	9,184	44,113	9,262	14,644	5,569	3,289	8,526
Technical Mt. Climbing	1,274	--	214	--	306	--	--	751
Horseback Riding	526	113	72	--	185	--	156	--
Nature Study	8,410	896	1,867	1,098	801	306	312	3,136

[a]Due to the few contacts made at Meadow Creek and Roaring Fork, their inclusion in this table would be misleading.

estimated number of visitors shown in Table 10. Nearly 45 percent of the area's users did some hiking. Bicycling, horseback riding, and boating were low participation activities.

Tables 12 and 13 give more information about the activity participation of visitors. Within the Indian Peaks the average number of parties participating in hiking per day is over 400. Large numbers of parties also participate in fishing and auto driving, on the average (Table 12). From Table 13 it can be seen how the activity participation is distributed over time. Hiking, the most popular activity, is a day activity for most hikers. Hikes of less than six hours are quite common. Fishing and auto driving are also of short duration while technical climbing and camping are done for longer periods of time.

The frequency distribution of activity participation by parties for each zone shown on Figure 1 is given in Table 14. Zone B, containing the Brainard Lake Area, is by far the most heavily used zone. A lot of activity also takes place in zones C, D, and E. Zone I is the least used. Reading across the rows, one can see where specific activities take place. For instance, over half the fishing participation is in zone B while another 25 percent of it happens in zone D. Over half the picnicking and hiking participation also happens in zone B. Zone A has nearly half of the 4-wheel driving.

This use information is not necessary to meet either of the study objectives. However, it does help in understanding the population of users of the Indian Peaks backcountry area. Also, it can be used by managers in budgeting and determining management actions.

Table 12. Estimated frequency distribution of activity participation by recreation parties per day by areas.

Activity	Total Indian Peaks Area	AREAS						
		Saint Vrain	Brainard Lake	Rainbow Lakes	Hessie	Rollins Pass	West Rollins	Monarch Lake
Boating	3.02		3.02					
Camping Near Auto	126.24	41.12	41.18	19.02	8.57	7.08	9.26	
Camping Away From Auto	116.73	6.62	30.58	12.34	21.55	9.01	6.60	26.45
Fishing	226.20	20.33	112.34	20.93	15.57	27.68	7.93	15.85
Picnicking	108.54	16.55	57.23	10.28	6.76	5.47	8.60	1.06
Auto Driving	271.30	22.22	96.29	21.08	20.51	56,99	54.19	
4-Wheel Driving	31.40	15.59	1.51	3.60	1.52	4.51	4.52	
Motorcycling	11.29	1.89	1.88	2.57	.78	2.25	1.99	
Bicycling	1.97	1.41	.30		.26			
Gathering For. Products	36.73	4.25	3.33	3.08	.78	1.61	1.99	21.69
Hiking/Walking	406.22	38.76	185.93	39.08	61.79	23.50	13.88	35.97
Technical Mt. Climbing	5.38		.90		1.29			3.17
Horseback Riding	2.22	.47	.30		.78		.66	
Hunting	.51			.51				
Nature Study	35.48	3.78	7.88	4.63	3.78	1.29	1.30	13.23

Table 13. Estimated frequency distribution of activity participation by recreation parties by length of participation.

Activity	Frequency	LENGTH OF PARTICIPATION							
		-1 hr.	1-3 hr.	4-6 hr.	7-12 hr.	½-1 day	2-4 day	5-7 day	+8 day
Boating	248		99	50	25	50	25		
Camping Near Auto	10,352					5,125	5,000	236	
Camping Away From Auto	9,529					4,100	5,000	332	25
Fishing	18,495	1,091	6,406	4,796	1,375	2,098	2,637	93	
Picnicking	8,901	1,558	4,774	1,474	113	343	435	21	
Auto Driving	22,247	9,228	8,198	3,218	459	539	171	65	
4-Wheel Driving	2,575	140	693	530	260	493	406		
Motorcycling	926	164	324	256	39		104	39	
Bicycling	162			25	78		60		
Gathering For. Products	3,012	1,469	1,003	198	39	82	156	65	
Hiking/Walking	33,310	1,659	9,778	7,329	2,194	3,959	7,790	438	25
Technical Mt. Climbing	441			174	50	154	64		
Horseback Riding	182	54	25			21	81		
Hunting	42						42		
Nature Study	2,910	331	605	391	152	88	1,240	103	

CLUSTER	VARIABLES	OBLIQUE FACTOR COEFFICIENT	COMMUNALITY	AVERAGE R WITH OTHER VARIABLES
DENSE VEGETATION	63	0.8583	0.8278	0.5697
	60	0.6827	0.5543	0.4532
	68	0.5975	0.4605	0.3967
	10	0.5167	0.3379	0.3430
MEADOW/FOREST	6	0.6961	0.4993	0.4563
	73	0.6666	0.5155	0.4370
	37	0.6614	0.4554	0.4336
	38	0.6575	0.5044	0.4310
	55	0.6446	0.4642	0.4225
	14	0.6069	0.4064	0.3978
RARE OR UNIQUE NATURAL FEATURES	21	0.8180	0.7311	0.5673
	18	0.7648	0.6177	0.5304
	16	0.7246	0.5641	0.5025
	58	0.7192	0.5515	0.4987
	22	0.7073	0.5642	0.4905
	34	0.6982	0.6451	0.4842
	71	0.6895	0.5780	0.4782
	43	0.6154	0.4515	0.4268
	49	0.6032	0.4381	0.4183
	25	0.5950	0.4227	0.4127
NUISANCES	41	0.7161	0.5624	0.4080
	66	0.6134	0.4756	0.3495
	36	0.5623	0.4068	0.3204
	35	0.5360	0.4206	0.3054
	65	0.5132	0.3627	0.2924
	2	0.4774	0.2720	0.2720

Table 14. Frequency distribution of activity participation by recreation parties by zones.

Activity	Frequency	ZONES A	B	C	D	E	F	G	H	I
Boating	248		248							
Camping Near Auto	10,352	2,692	4,244	1,139	1,967	207			52	
Camping Away from Auto	9,572	379	2,872	861	3,350	191	96	574	1,532	38
Fishing	18,549	1,113	10,573	1,298	4,266	371	93	185	556	93
Picnicking	8,901	979	5,430	623	1,335	356	53	27	53	
Auto Driving	22,247	1,335	9,566	1,112	9,566	4,894				
4-Wheel Driving	2,575	1,148	180	258	747	283				
Motorcycling	926	130	194	194	444	167				
Bicycling	162	97	32		32					
Gathering For. Products	3,012	331	452	241	392	90		331	1,144	30
Hiking/Walking	33,310	2,332	17,321	2,332	8,994	833	167	666	1,666	167
Technical Mt. Climbing	441		93		159	31		31	128	
Horseback Riding	182	31	31		60	31		31		
Nature Study	2,910	262	273	291	436	116		262	524	29

Resource Attributes

From the 286 usable questionnaires returned, analyses were undertaken to identify resource attributes adding to or detracting from the satisfaction of Indian Peaks backcountry area users. The 73 resource attribute items of the mail questionnaire were cluster analyzed using the BC-TRY cluster analysis system (Tryon and Bailey, 1970), and nine key-clusters were identified.[1]

A listing of the 73 resource attribute items in descending order of their population means is given in Table 15. The item rated by the population to most strongly add to satisfaction was "clean fresh air" while "murky or discolored water" was rated as the most negative of the 73 items. In general, the most positively rated items were those dealing with a pollution free environment and scenic beauty. The most negatively rated items were those dealing with man's impact and nuisances. The larger

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[1]Cluster analysis describes a mathematical procedure which is a special case of the generalized method of grouping variables into independent dimensions (Tryon, 1959). All the forms of factor analysis (centroid, principle axis, image, etc.) fall into this category. Cumulative communality key-cluster analysis (the procedure used here) differs from other forms of factor analysis more in its calculations and statistical considerations than in any general conceptual framework.

The major difference between the other forms of factoring and key-cluster factoring lies in the definition of a dimension. It is this difference which makes key-cluster factoring more useful in the present context. Centroid and principle axis factoring both define a dimension as the entire set of variables weighted by a specially selected pattern of weights. It is the weights that differ from dimension to dimension, not the variables. Key-cluster factoring, however, defines a dimension as a subset of the variables. The subset is composed of the group of variables most collinear (highly related) to a "pivot" variable. The pivot variable is selected on the basis of its pattern of intercorrelations with the entire variable set. Key-cluster factors (unlike centroid or principle axis factors) are not necessarily orthogonal. These characteristics give key-clustering two important advantages over other factoring procedures. The obliqueness of the factors more closely represents the dimensions in the "real world," and more significantly, by defining a cluster as a subset, much of the unaccounted variance in the system is removed from the defined dimensions.

Table 15. Resource attribute items listed in descending order of means (1 = most strongly adds to satisfaction, 9 = most strongly detracts from satisfaction).

	Item	Mean	Standard Deviation	N
1.	clean fresh air	1.1237	0.5186	285
2.	wildflowers in bloom	1.5965	0.8348	285
3.	waterfalls	1.6316	0.8590	285
4.	drinkable mountain water	1.6399	1.0068	286
5.	few evidences of where others have been	1.6561	1.2681	285
6.	mature virgin forests	1.6818	0.8890	286
7.	diverse scenery	1.8035	1.0277	285
8.	wide views of the terrain	1.8566	1.0020	286
9.	lake views	1.8702	0.8547	285
10.	alpine meadows	1.8706	1.0415	286
11.	snow capped mountains	1.8776	1.0288	286
12.	meadows among the forest	1.8951	0.9910	286
13.	isolated lakes	1.9018	1.0974	285
14.	aspen groves	1.9301	0.9799	286
15.	abundant sources of water	1.9509	1.0651	285
16.	mountain springs	2.0351	1.0624	285
17.	scenic overlook	2.0386	1.2177	285
18.	columbines	2.0421	1.3079	285
19.	hikeable ridgetops	2.0702	1.1856	285
20.	glaciers	2.1263	1.2161	285
21.	dense stands of pine	2.1614	1.1310	285
22.	large roaring streams	2.1783	1.1795	286
23.	big horned sheep	2.2035	1.3458	285
24.	areas above timberline	2.2421	1.2514	285
25.	beaver dams and ponds	2.2596	1.1406	285
26.	song birds	2.2902	1.1357	286
27.	a variety of different sized streams	2.3252	1.1984	286
28.	elk	2.3392	1.3691	286
29.	rugged terrain	2.3754	1.4712	285
30.	snowfields	2.4175	1.3022	285
31.	small furbearers	2.4860	1.2948	286
32.	predatory birds such as owls and hawks	2.5000	1.4185	286
33.	ptarmigan	2.5614	1.6202	285
34.	mule deer	2.5664	1.3146	286
35.	a variety of rock types and minerals	2.5789	1.3051	285
36.	wind sculptured rocks	2.5930	1.3203	285
37.	steep gorges	2.6912	1.5748	285
38.	squirrels	2.7028	1.3219	286
39.	grouse	2.7098	1.4301	286
40.	small streams you can step across	2.7359	1.4082	284
41.	shaded areas without underbrush	2.7552	1.2940	286
42.	vast areas with no designated trails	2.7727	1.7918	286
43.	unusually shaped rocks	2.7762	1.3112	286
44.	rock outcroppings	2.7902	1.3733	286
45.	rare plants	2.8175	1.4198	285
46.	rock towers	2.8386	1.4661	285
47.	areas with dense vegetation	2.8421	1.4843	285

Table 15. (continued)

	Item	Mean	Standard Deviation	N
48.	hot springs	2.8908	1.5896	284
49.	slow moving streams with deep holes	2.9895	1.5298	285
50.	brook trout	3.0106	1.5485	284
51.	Indian artifacts	3.0175	1.5457	285
52.	steep terrain areas	3.0211	1.6795	285
53.	naturally reproducing fish populations	3.0386	1.6507	285
54.	fossil outcrops	3.0455	1.4147	285
55.	rainbow trout	3.1088	1.6750	285
56.	boulder fields	3.1404	1.5222	285
57.	caves	3.1408	1.5179	284
58.	steep terrain	3.1579	1.8083	285
59.	grayling	3.1873	1.8390	283
60.	brown trout	3.2702	1.6439	285
61.	easily obtained firewood	3.2877	1.6548	285
62.	cutthroat trout	3.3298	1.6827	285
63.	stocked fish	3.6923	1.7768	284
64.	streams lined with brush	3.7958	1.8349	284
65.	bears	4.0845	2.3407	284
66.	marshes	4.1084	1.9591	286
67.	streams with many fly hatches	4.2289	2.0333	284
68.	reservoirs in the backcountry	4.4596	2.3191	285
69.	rainy weather	5.9754	1.9000	285
70.	evidence of mining activity	6.1888	2.3872	286
71.	insects that bite	6.6912	1.8494	285
72.	evidence of logging activity	6.8182	2.0265	286
73.	murky or discolored water	7.1895	1.9265	285

standard deviations for the more negative items indicates respondents were not as uniform in their rating of these items as they were for the most positive items which have small standard deviations.

For planning in specific areas, like the Indian Peaks, the responses to each item are useful. However, to build a more general model of the resource attributes facilitating dispersed recreation opportunities, the items have been grouped into more generic dimensions. This was done using the BC-TRY cluster analysis system.

Nine key-clusters (dimensions) were found and given the following names: Fish related, rugged topography, intrusions, wildlife, rare or unique natural features, dense vegetation, meadow-forest, water related, and nuisances. Each dimension, its reliability, and content items is shown in Table 16. Appendix D contains several descriptive statistics for each dimension and its items including oblique factor coefficients, communalities, and the average R with the definers. These statistics can be used to understand the structure of each dimension.

The individual items in each dimension listed in Table 16 can be used in naming and defining the dimensions. The names chosen are our subjective descriptions of the content of each dimension. These names are used in subsequent discussion.

Table 16. Resource attribute dimensions for the Indian Peaks.

Dimension Name	Content Items	Reliability Coefficient
FISH RELATED	Brown trout Cutthroat trout Brook trout Rainbow trout Slow moving streams with deep holes Grayling Naturally reproducing fish populations Stocked fish	.9282
RUGGED TOPOGRAPHY	Steep terrain Steep terrain areas Steep gorges Boulder fields Areas above timberline Glaciers Snowfields Rugged terrain	.9281
INTRUSIONS	Evidence of logging Evidence of mining Reservoirs in the backcountry	.7707
WILDLIFE	Small furbearers Grouse Squirrels Song birds Ptarmigan Predatory birds Elk Mule deer Big Horned sheep	.8894
RARE OR UNIQUE NATURAL FEATURES	Wind sculptured rocks Fossil outcrops Rock towers Variety of rock types and minerals Unusually shaped rocks Caves Rock outcroppings Rare plants Indian artifacts Hot springs	.9156

Table 16. (continued)

Dimension Name	Content Items	Reliability Coefficient
DENSE VEGETATION	Areas with dense vegetation Dense stands of pine Streams lined with brush Mature virgin forests	.7949
MEADOW/FOREST	Alpine meadows Aspen groves Meadows among forest Columbines Wildflowers in bloom Diverse scenery	.8306
WATER RELATED	Mountain springs Abundant sources of water Different sized streams Waterfalls Lake views Small streams you can step across Large roaring streams	.8534
NUISANCES	Insects that bite Marshes Murky or discolored water Bears Streams with many fly hatches Rainy weather	.7695

For all the users of the Indian Peaks that were sampled, the mean rating of each dimension is shown in Table 17. As one would expect, some resource attributes are highly valued as adding to satisfaction, some attributes are unimportant, and some attributes are perceived as detracting from satisfaction. Most of the attribute dimension have positive values and are perceived as adding to satisfaction with the Meadow-Forest and Water Related dimensions being the most postive. Intrusions are perceived as detracting from the recreational experience.

Table 17. Mean rating values for the nine resource attribute dimensions.

Dimension	Mean Value	Contribution to Satisfaction
Meadow-Forest	1.8563	Strongly Adds
Water Related	2.1039	Strongly Adds
Wildlife	2.4844	Moderately/Strongly Adds
Dense Vegetation	2.6203	Moderately Adds
Rugged Topography	2.6465	Moderately Adds
Rare or Unique Natural Features	2.8489	Moderately Adds
Fish Related	3.2033	Moderately Adds
Nuisances	5.3796	Neither Adds Nor Detracts
Intrusions	5.8222	Slightly Detracts

While we can list these attribute dimensions in order based upon their mean values, it is likely that groups of area users perceive the value of these dimensions differently. For example, it is likely that some users value the fish related dimension much more highly than the average user, or that some see the nuisances much more as detractants from their satisfaction.

Therefore, an object cluster analysis was performed to identify the patterns of response of users over the attribute dimensions. Users with similar patterns of response have been grouped together into object types. Table 18 shows how each of the object types relates to each of the attribute dimensions.

Both the rows and columns in Table 18 provide useful information. Reading down the columns reveals the variability in response to attribute dimensions. The greatest differentiation in scores is for the intrusions dimension where type 1 indicates these attributes slightly add to satisfaction and type 6 indicates that they moderately detract from satisfaction. The least differentiation is for the nuisances dimension.

In looking across the rows, it is revealed that the types are actually quite similar. However, each type does have some features that characterize it. For instance, type 1 is not critical of intrusions on the environment nor is it greatly bothered by nuisances in the backcountry. Type 2 is the most positive type on many of the dimensions including rugged topography, wildlife, water related, dense vegetation, and rare and unique features. It was also very positive on meadows/forests. Type 3 was most positive on the meadow/forest dimension while not being very high on the fish related dimension. This group was also one of the more negative toward nuisances. A high positive score on the fish related dimension characterizes type 4. Type 5, on the other hand, is characterized by having the lowest scores on most dimensions. Type 6 has a quite low score for the fish related dimension and is the most negative toward intrusions. Finally, 7 percent of the population does not fit into any of these patterns and each individual (of these 7 percent) is unique and not possible to type.

Table 18. Qualitative addition to or detraction from satisfaction and mean values for each attribute dimension for the object types (groups of individuals).

Type	Proportion of Population	Fish Related	Rugged Topography	Intrusions	Wildlife	Water Related	Dense Vegetation	Meadows/ Forests	Rare/Unique Features	Nuisances
1	11.5	Moderately Adds (1.68)	Moderately Adds (2.34)	Slightly Adds (1.03)	Moderately Adds (2.26)	Strongly Adds (3.00)	Strongly Adds (2.68)	Strongly Adds (2.93)	Moderately Adds (2.43)	Neither (0.09)
2	16.0	Strongly Adds (2.94)	Strongly Adds (3.28)	Slightly Detracts (-1.28)	Most Strongly Adds (3.64)	Most Strongly Adds (3.69)	Strongly Adds (3.28)	Most Strongly Adds (3.77)	Most Strongly Adds (3.70)	Neither (0.17)
3	11.5	Slightly Adds (1.10)	Strongly Adds (2.69)	Slightly Detracts (-0.55)	Strongly Adds (2.90)	Strongly Adds (3.41)	Strongly Adds (3.08)	Most Strongly Adds (3.79)	Strongly Adds (2.95)	Slightly Detracts (-0.83)
4	15.0	Strongly Adds (3.07)	Moderately Adds (1.97)	Slightly Detracts (-1.34)	Strongly Adds (2.65)	Strongly Adds (2.83)	Moderately Adds (2.07)	Strongly Adds (3.07)	Moderately Adds (2.12)	Slightly Detracts (-0.52)
5	22.5	Slightly Adds (0.98)	Moderately Adds (1.56)	Slightly Detracts (-0.81)	Moderately Adds (1.57)	Moderately Adds (2.12)	Slightly Adds (1.33)	Strongly Adds (2.53)	Moderately Adds (1.57)	Slightly Detracts (-0.91)
6	16.5	Slightly Adds (1.05)	Strongly Adds (2.63)	Moderately Detracts (-2.36)	Moderately Adds (2.39)	Strongly Adds (2.63)	Moderately Adds (2.36)	Strongly Adds (3.08)	Moderately Adds (2.23)	Slightly Detracts (-0.52)
Unique	7.0									

In looking at tables 17 and 18 together it appears that for most Indian Peaks backcountry users scenic attributes like meadows and forests, water features, and wildlife really facilitate having satisfying experiences. Other attributes like fish and rugged topography are important for some and not so important for others. Finally, nuisances and man-made intrusions on the environment are detractors to most users' satisfaction.

Discussion

The goal of this research was to begin development of a consumer preference based inventory and analysis procedure for assessment of dispersed outdoor recreation opportunities on forest and rangelands. Therefore, it is necessary to discuss inventory and analysis to show how the kinds of information produced in this study lead toward the project goal. In doing this we will look at the nature of recreation planning as a part of integrated land management planning. Then, we will briefly examine recreation inventory and classification systems proposed over the past few years. A regional assessment system which builds on these other systems is then advocated and outlined. Then we discuss a more specific inventory and assessment procedure which fits within the regional system. The concluding sections deal with the relationship of the empirical study reported above to the regional and specific inventory and assessment systems, and with research needs to make the systems operational.

Recreation Planning for Forest and Rangelands

Outdoor recreation planning for forest and rangelands is only one component of multiple resource planning. In this section we describe the major steps and components of outdoor recreation planning and show where it is related to planning for the use of other resources in a multiple use context.

An overview of the recreation inventory and planning system and its relationship to the inventory and planning systems for other resource uses can be obtained through examination of Figure 2. Each box of the figure is lettered for easy reference during the discussion which follows.

As with all planning processes, recreation planning begins with a problem identification phase (box A). This phase may involve public participation activities, in-agency study and discussion, and external pressure for planning.

After a planning problem is recognized, those activities leading to identification of consumer demand and the relationship between demand and supply are undertaken. Involved are activities associated with consumer analyses (box B), participation analyses (box C), and demand analysis (box D). Consumer and participation analysis are divided into two boxes (though they might be in one) to emphasize the current state of the art. Participation analyses are usually activity oriented and amount to counting the number of participants. These data are usually incorporated into demand analysis through trend projections.

Consumer analyses represent a wider range of topics. Studies of motivation and preference, usually focusing on recreation experiences, are involved. Also, studies of physical, social, and managerial attributes perceived by consumers as being important to their satisfaction belong here. Consumer analysis of preference can be easily meshed with demand analysis as shown by the combined work of Brown, Hautaluoma, and McPhail (1977) and Miller, Prato, and Young (1977). Consumer analyses about physical, social, and managerial attributes feed directly into capability and suitability analyses (boxes F and G).[2]

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[2]It is the consumer analysis of physical resource attributes which is the subject of the research reported here.

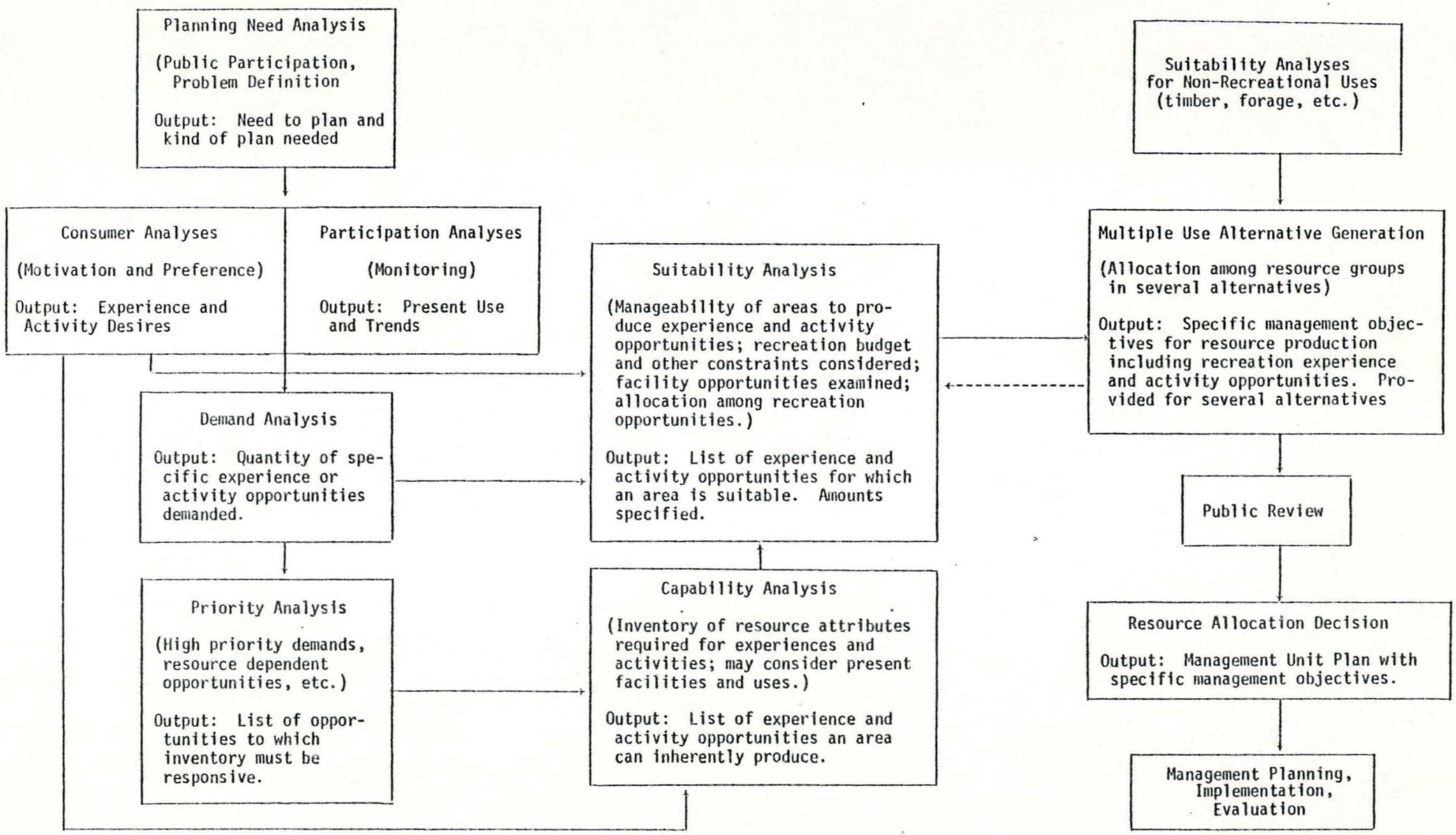
Planning Need Analysis
(Public Participation, Problem Definition
Output: Need to plan and kind of plan needed
Consumer Analyses
(Motivation and Preference)
Output: Experience and Activity Desires
Participation Analyses
(Monitoring)
Output: Present Use and Trends
Demand Analysis
Output: Quantity of specific experience or activity opportunities demanded.
Priority Analysis
(High priority demands, resource dependent opportunities, etc.)
Output: List of opportunities to which inventory must be responsive.
Suitability Analyses for Non-Recreational Uses (timber, forage, etc.)
Suitability Analysis
(Manageability of areas to produce experience and activity opportunities; recreation budget and other constraints considered; facility opportunities examined; allocation among recreation opportunities.)
Output: List of experience and activity opportunities for which an area is suitable. Amounts specified.
Capability Analysis
(Inventory of resource attributes required for experiences and activities; may consider present facilities and uses.)
Output: List of experience and activity opportunities an area can inherently produce.
Multiple Use Alternative Generation
(Allocation among resource groups in several alternatives)
Output: Specific management objectives for resource production including recreation experience and activity opportunities. Provided for several alternatives
Public Review
Resource Allocation Decision
Output: Management Unit Plan with specific management objectives.
Management Planning, Implementation, Evaluation

Figure 2. Inventory-Planning System for Recreational Opportunities

Demand analysis produces an estimation of the quantity of a specific activity or experience opportunity demanded. The output here represents the total list of activity and experience opportunities for which the subsequent inventory and planning activities are to be representative. Over time this list will change with social, political, technological, and ideological changes. Demand estimation is linked directly to both capability and suitability analyses, though it may also be filtered through some decision rules used to prioritize the list of items demanded (box F). These decision rules may be designed to focus on the largest demands, protection of minority demands, or demand for recreation opportunities which are resource dependent.

Box F is capability analysis. Capability is the inherent potential of a land or water unit to provide specified goods or services according to clearly defined criteria. The criteria are quantities and qualities of specific physical attributes of the land or water base. Since the criteria are specific, capability is measured as capable or not capable.

Physical resource inventory is a component of capability analysis. Resource elements need to be inventoried which relate to production of specific activity and experience opportunity. For instance, to inventory land for its capability to produce Primitive type recreation opportunities, it is necessary to inventory remoteness of area, size of area, and man-caused resource modification. For specific experience opportunities oriented toward isolation of the recreationist, vegetation and terrain features might be added to the list for general primitive opportunities. Each of these factors to be inventoried needs to have specific standards which indicate whether or not the area is capable of providing a specific recreational opportunity. The standards employed to identify primitive recreation opportunities might be: (1) greater than or equal to three miles from any

constructed road; (2) greater than or equal to 5,000 acres; (3) less than or equal to 1 percent of land area in permanent modification. By using fixed criteria (which can be changed if they are found inapplicable), an area can be evaluated as capable or not capable of providing an opportunity. The output from the capability analysis is a list of demanded activity and experience opportunities that the land and water base is inherently capable of producing. This list may be expanded or shortened by management activities considered in the suitability analysis.

Suitability analysis is represented by box G. Suitability refers to an estimation of the manageability of an area to produce activity and experience opportunities. Well defined criteria for determining suitability are necessary. The criteria are quantities and qualities of physical, social and managerial attributes applied to the land and water base and to the recreating population. Since the criteria are specific, suitability is indicated as suitable or not suitable.

In addition to classifying areas as suitable or not suitable for a specific recreation opportunity, a capacity estimate is made for those areas classified suitable. This capacity estimate enables the planner to indicate specific output associated with an allocation decision.

The suitability analysis is conducted in the same way as the capability analysis, only there are more items to consider. Consideration of available management tools, budgets, personnel skills and numbers, technology changes, and policy constraints are all important. The effect of each of these on whether or not it is managerially feasible to realize the inherent capability, or to modify it, is weighed in the planner's decision calculus.

The basic output from the suitability analysis is a list of demanded activity and experience opportunities plus the quantity of each opportunity

that can be supplied. This list may be carried to the next stage, multiple use alternative generation (box H), or may be subjected to a compatibility analysis and recreation resource allocation. It is most likely that a decision will be made at this point to reduce the number of suitable recreation opportunities to move forward to the next stage.

Suitability analysis producing a list of recreation opportunities and their quantities which can be produced, represents the terminus of the unique recreation inventory and planning system. The output from the suitability analysis is then meshed with the outputs from similar systems for other goods and services (box I), to produce alternative multiple use resource allocation plans. Here, recreation must compete with other goods and services for the land and water base, given the priority of demands for all goods and services. The output of box H would be different allocation plans that the public and the agency might review (box J). A resource allocation decision is to be made from among these and other plans generated and considered (box K). Because of the way it has been generated, this unit plan will contain specific management objectives for the recreation sector. These objectives are described in terms of specific physical, social, and managerial attributes which make the activity and experience opportunities possible.

These specific recreation management objectives are the basis for developing more specific recreation activity plans, for implementation of the unit plan, and for recreation system evaluation (box L).

Recreation Inventory and Classification Systems

Several outdoor recreation inventory and land classification systems have been developed over the last few years. Each has some strong points in theory, logic, simplicity, comprehensiveness, or other factors. Each also

has some serious limitation for use in outdoor recreation inventory and assessment. Several of these systems are briefly described below in order to lay a foundation for the system we will propose.

BOR Area Classification Plan

The purpose of the Bureau of Outdoor Recreation Area Classification Plan (ACP) is to provide a common framework for classifying recreation resources. The approach of ACP is cited as recreation zoning based upon relationships between physical resource characteristics and public recreation needs. The system attempts to encompass the full range of physical resources needed for all kinds of outdoor recreation activity and specify the types of management required for optimum recreation uses of each area. While the classification is based primarily on physical features, economic and social variables are important in determining the class of an area.

The ACP is designed for applicability to large geographical areas regardless of land ownership. All land with a potential for recreation is divided into the following classes: Class I, High Density Recreation Areas; Class II, General Outdoor Recreation Areas; Class III, Natural Environment Areas; Class IV, Outstanding Natural Areas; Class V, Primitive Areas; Class VI, Historic and Cultural Sites. The classification is based on a general description of the area, the types of activities which take place on an area, the degree of development of an area, agency responsibility and management recommendations. The classification system does not represent a continuum based on parameters of these variables.

Quite broadly, Classes I, II, and III are separated based primarily on proximity to an urban setting and degree of development, while Class IV is a measure of the uniqueness of the natural setting, and Class VI is distinguished as having historic value. Class V is specifically for Congressionally and Administratively designed wilderness and primitive areas.

The method of assigning an area its classification is largely subjective. Aside from basing classifications on the descriptions provided, an area should be classified according to economic and social considerations and public needs for different kinds of recreation activity, uses of other natural resources and objectives of the owner. Additionally, it is suggested that when the physical features and location of an area are such to permit its classification in more than one class, it should be placed in the class which in the long run will produce optimum contribution to values.

The most obvious shortcoming of the BOR Area Classification Plan is that it has only general criteria for classifying areas. As such it allows for a great deal of subjective judgment on the part of the user. In addition, it is unclear if the system represents a classification based on the potential for recreation or a classification based on what the agency feels would best provide guidelines for what an area should offer. There is a lack of distinction between identification of an area's capability and decisions based on management philosophy and policy.

Recreation Opportunity Inventory and Evaluation

The Recreation Opportunity Inventory and Evaluation (ROIE), developed in Region I, U.S. Forest Service, attempts to identify potential recreation opportunity as well as potential recreation use. Activity preferences serve as the base for inventory and evaluation. These preferences have been grouped into preference types (active-appreciative, active-extractive, passive-appreciative, sociable-learning, and active-expressive). Elements of the environment relating to each of these preference types are inventoried and the land is classified based upon its capability to produce preference type opportunities. The result is the measurement of recreation opportunity per type of environmental setting per unit of land. The land units delineated

are called Recreation Experience Units (REU). The bases for selection of the preference type and the environmental setting attributes are research and management experience based judgments made by the authors of ROIE.

Once land have been classified to show the opportunities available for each preference type, social visitation capacities are estimated. Several kinds of quantitative data are combined to provide these estimates.

The ROIE has several factors which make it a good recreation inventory and planning system. First, it focuses on inventorying opportunities to meet recreationist preferences. Second, it attempts to relate environmental attributes to these preference types. And, third, it enables production of capacity estimates.

One limitation of the method is its lack of foundation in empirical research. Both the lists of preference types and environmental attributes were judgmentally produced, and the relationships between these two lists are inferred. Other limitations involve complicating the system by using unnecessary mathematical synthesis of data, the frequent use of subjective ratings, and criteria which limit the method's applicability to mountainous regions.

Recreation Inventory Instructions

The Recreation Inventory Instructions (RII) attempts to specify and describe the attributes of forest land in terms of kind, quality, and amount of recreation use which it is capable of supporting without unacceptable depreciation. There is an implied behavioral base to this method since recreation is defined as the response of people to certain basic needs or motives.

Measurements of quality and quantity are made for three phases of the recreation resource:

(1) Dispersed Phase--a description of lands and waters with characteristics for activities which occur in dispersed forms;

(2) Intensive Phase--a description of lands and waters with the characteristics for development to support recreation activities which occur in relatively concentrated or mass forms;

(3) Visual Phase--a description of selected individual features, objects, or conditions of prominence which contribute to landscape and for scenery as viewed by people.

For each of these phases qualitative criteria are evaluated and summary indexes produced. The higher the summary index for each phase, the higher the land quality for providing that phase opportunity.

Capacity estimates are generated for the classified lands using either comparative analyses or using generalized RII guidelines. Where appropriate the RII relies on RIM procedures for estimating capacity.

The structure of RII is a solid approach to the inventory process. It assumes a behavioral orientation although the theoretical basis for this is not explicit. It attempts to relate land area attributes to recreation experience classes. It provides a procedure for estimating capacity. And, it attempts to mesh with other recreation planning and management procedures, like those in the RIM system.

The RII is limited by not being founded upon an empirical research base. Additionally, some of the psychological notions underlying the method appear, based upon research in motivation and consumer psychology, to be erroneous. A further complication with RII is its specification of quality which implicitly puts a premium on primitive, natural environment types of recreation.

Canadian Land Inventory

The Canadian Land Inventory (CLI) is a straightforward way to arrive at estimates of recreational capability. The method provides an overview of the quality, quantity, and distribution of natural recreation resources. The basic inventory unit is the land form or land unit and is based on the homogeneity of physical features within a unit.

Based upon a set of resource attributes related to activity subclasses, the capability of the land to produce opportunity for each activity subclass is measured. Subjective judgments are then used to produce class rankings for each land unit. These rankings range from very high capability to very low capability.

The CLI provides a basic organizing framework for recreational inventory that is simple and easy to implement. It also makes the relationship of inventory to the planning process explicit by inventorying to produce estimates of capability.

This system does not take advantage of empirical research as it is presently used. However, it can easily incorporate research data or attribute-activity relationships as they become available. Another shortcoming is that it uses only activity classes and subclasses without any recognition of the specific products demanded, or to be supplied. Also the method does not incorporate suitability analyses or lead to estimation of capacity, both of which are necessary for resource planning.

Summary

Because of its limited applicability to the RPA inventory and assessment problem, the BOR Area Classification Plan is not considered further. Several good ideas, however, are embodied in the ROIE, RII, and CLI and can be used in development of a better recreation inventory and assessment

system. A better system could derive its framework from the CLI and specify a relationship between experience opportunities and attributes of the physical, social, and managerial settings in which preferred experiences take place. Like the CLI the system would involve an identification of inherent capability based upon inventory and evaluation of the physical attributes of the land and water base. Like the ROIE, the system should be behaviorally based and acknowledge the importance of user preference. And, like the ROIE and the RII, the system should deal with experience opportunities and with generating quantitative estimates of opportunity (capacities).

Regional Assessment System

In devising an outdoor recreation inventory and assessment system, there are at least two levels of specification we might consider. First is developing a general regional system, and second is developing a more specific unit planning system. Here we will discuss the first level, and in the next section we will discuss the second.

A general regional outdoor recreation inventory and assessment system is being developed in Region 2 of the U.S. Forest Service.[3] In structure it builds upon the foundations provided by the ROIE, RII, and CLI systems previously discussed. It is a system which recognizes the need to specify both experience opportunities and settings (physical, social, and managerial) in which the opportunities can be provided. It also recognizes the state of the art which presently can be applied to RPA and area guide planning efforts, and in most cases which must be applied to unit and forest planning as well (though it would be desirable to move toward more specific outdoor recreation inventory and assessment for all lands).

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[3]Primary developers of the system are P. J. Brown, Colorado State University, B. L. Driver, Rocky Mountain Forest and Range Experiment Station, USFS, and C. McConnell, Region 2, USFS. It has recently been used by Region 2, USFS planners in developing area guides.

The Regional Assessment System recognizes a spectrum of recreation opportunities (Wagar, 1966) in terms of experience opportunities. Specific activity opportunities could be associated with each point on the spectrum. The experience opportunity classes and their associated physical, social, and managerial settings are in Table 19. For simplicity, the experience opportunity classes are labeled primitive, semi-primitive non-motorized, semi-primitive motorized, intermediate, concentrated, and modern urbanized Given this spectrum, lands ranging from those in downtown New York City to those in the Brooks Range in Alaska could be classified for their outdoor recreation opportunity capability.

To identify lands capable of producing different opportunities, a set of specific criteria is necessary. Table 20 contains sample criteria that might be applied to assess capability. The names of the criteria are: size of area, remoteness, irreversible evidence of man, and renewable resource modification. Specific standards for each criterion and for each recreation opportunity class are also given.

Using the table to identifiy capability follows a sequential process. First, remoteness needs to be assessed. This is done by drawing lines on a map at the intervals from roads shown in the table. Once these lines are drawn, the area inside connecting lines can be calculated. Then based upon inventories of evidences of man and renewable resource alterations, one can describe the amount of area affected.

To apply the standards to determine recreation opportunity class, the planner need only match the mapped or calculated data to the values given in each row of the table. For instnace, if an area of 10,000 acres was located more than three miles from any constructed road, contained less than one percent of its area in an irreversibly modified state, and

Table 19. Experience opportunity classes and their associated physical, social, and managerial settings.

Opportunity Class	Experience Opportunity	Physical, Social, and Managerial Setting
I. Primitive	Opportunity for isolation from the sights and sounds of man, a vastness of scale, to feel a part of the natural environment, to have a high degree of challenge and risk, and to use outdoor skills.	Area is characterized by essentially unmodified natural environment of fairly large size. Concentration of users is very low and evidence of other area users is minimal. The area is managed to be essentially free from evidence of man-induced restrictions and controls. Only essential facilities for resource protection are used and are constructed of on-site materials. No facilities for comfort or convenience of the user are provided. Spacing of groups is informal and dispersed to minimize contacts with other groups or individuals. Motorized use within the area is not permitted.
II. Semi-Primitive Non-Motorized	Some opportunity for isolation from the sights and sounds of man and a vastness of scale, but not as important as for primitive opportunities. Opportunity to have a high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills.	Area is characterized by a predominantly unmodified natural environment of moderate to large size. Concentration of users is low, but there is often evidence of other area users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Facilities are primarily provided for the protection of resource values and safety of users. On-site materials are used where possible. Spacing of groups may be formalized to disperse use and provide low-to-moderate contacts with other groups or individuals. Motorized use is not permitted.

Table 19. (continued)

Opportunity Class	Experience Opportunity	Physical, Social, and Managerial Setting
IIb. Semi-Primitive Motorized	Some opportunity for isolation from the sights and sounds of man and a vastness of scale, but not as important as for primitive opportunities. Opportunity to have a high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills. Explicit opportunity to use motorized equipment while in the area.	Area is characterized by a predominantly unmodified natural environment of moderate to large size. Concentration of users is low, but there is often evidence of other area users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Facilities are primarily provided for the protection of resource values and safety of users. On-site materials are used where possible. Spacing of groups may be formalized to disperse use and provide low-to-moderate contacts with other groups or individuals. Motorized use is permitted.
III. Intermediate	About equal opportunities for affiliation with user groups and opportunities for isolation from sights and sounds of man. Opportunity to have a high degree of interaction with the natural environment. Challenge and risk opportunities are not very important. Practice and testing of outdoor skills may be important. Opportunities for both motorized and non-motorized forms of recreation are desired.	Area is characterized by predominantly natural environment with moderate evidences of the sights and sounds of man. Such evidences usually harmonize with the natural environment. Concentration of users may be low to moderate with facilities sometimes provided for group activity. Evidence of other users is prevalent. Controls and regimentation offer a sense of security and are on-site. Rustic facilities are provided for convenience of the user as well as for safety and resource protection. Moderate densities of groups is provided for in developed sites and on roads and trails. Low to moderate densities prevail away from developed sites and facilities. Renewable resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.

Table 19. (continued)

Opportunity Class	Experience Opportunity	Physical, Social, and Managerial Setting
IV. Concentrated	Opportunities to experience affiliation with individuals and groups are prevalent as is the convenience of sites and opportunities. These factors are more important than the setting of the physical environment. Opportunities for challenge, risk taking, and outdoor skills are unimportant.	Area is characterized by substantially modified natural environment. Renewable resource modification and utilization practices are primarily to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of man are readily evident, and the concentration of users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate to high densities of groups and individuals are provided for in developed sites, on roads and trails, and water surfaces. Moderate densities are provided for away from developed sites. Facilities for intensified motorized use and parking are available.
V. Modern Urbanized	Opportunities to experience affiliation with individuals and groups are prevalent as is the convenience of sites and opportunities. Experiencing natural environments, having challenges and risks afforded by the natural environment, and the use of outdoor skills are relatively important.	Area is characterized by a substantially urbanized environment although the background may have natural elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Soil protection usually accomplished with hand surfacing and terracing. Sights and sounds of man, on-site, are predominant. Large numbers of users can be expected both on-site and in nearby areas. A considerable number of facilities are designed for the use and convenience of large numbers of people and include electrical hookups and contemporary sanitation services. Controls and regimentation are obvious and numerous. Facilities are provided for special activities. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

Table 20. RECREATION OPPORTUNITY CAPABILITY CRITERIA

CRITERION NAME	STANDARD				MINIMUM ACCEPTABLE STANDARD SCORE BY OPPORTUNITY CLASS					
	4	3	2	1	I	IIa	IIb	III	IV	V
SIZE OF AREA (acres)		>5,000	2,500-5,000	<2,500	3	2	3	1	1	1
REMOTENESS (sights and sounds of man) (miles or equivalent screening)	≥3 miles from any constructed road	≥1/4 mile from any constructed road	≥1/4 mile from any primary roads	Adjacent to any road	4	3	3	2	2	1
IRREVERSIBLE EVIDENCE OF MAN (mines, reservoirs, roads, etc. which cannot be feasibly obliterated) (% of total area)	<1% of area	1-5% of area	5-25% of area	>25% of area	4	3	3	2	1	1
RENEWABLE RESOURCE MODIFICATION (non-permanent alterations to natural environment) (% of total area)		<30% of area	30-70% of area	>70% of area	3	2	2	2	1	1

had been grazed by cattle over 20 percent of its area, it would be capable of producing opportunity for recreation class I-V opportunities. If cattle grazing had taken place over 45 percent of the area, then the applicable recreation classes would have been IIa-V.

After recreation opportunity capability identification, coefficients can be applied to indicate the capacity, or possible production output, for each classified area. Sample maximum supply coefficients are shown in Table 21. These could be adjusted for season of use, total area, or to persons at one time with very little effort.

Table 21. Recreation day coefficients to determine maximum supply.

Opportunity Class	Coefficients
1. Primitive	8 Rec. Days/Acre/Year
2. Semi-Primitive Non-motorized	20 Rec. Days/Acre/Year
3. Semi-Primitive Motorized	20 Rec. Days/Acre/Year
4. Intermediate	1800 Rec. Days/Acre/Year
5. Concentrated	7300 Rec. Days/Acre/Year
6. Modern Urbanized	36500 Rec. Days/Acre/Year

The major shortcoming with this system is its non-specificity. The experience opportunities considered are very general, and only generalized statements of physical, social, and managerial attributes are used. Another limitation given the state of the art is the poor empirical base for the standards and for deriving capacity coefficients.

Research needs to be done to overcome these last two problems while a more specific system needs to be developed to overcome the first one.

Experience Specific Assessment System

Within each of the outdoor recreation opportunities identified using the regional assessment system are many activity and specific experience opportunities. For each appropriate activity within one of the regional scale recreation opportunities are several specific experience opportunities. And for each specific experience opportunity there are physical, social, and managerial attributes of the recreation setting which facilitate users in having experiences they prefer.

What is being suggested is development of an inventory and assessment system which enables identification of capability to produce specific experience opportunities. In conjunction with the identification it is also necessary to be able to estimate capacity.

The state of the art, in general, does not allow the degree of specification needed. Experience opportunities within most activities are not known, though promising research is beginning to provide needed answers (Driver and Knopf, 1977; Brown, Hautalouma, and McPhail, 1977; Hautaluoma and Brown, 1977). Also, far too little is known about situational attributes which facilitate satisfying recreational experiences. The research reported in this document focuses on this problem.

While the regional assessment system outlined previously would provide most of the information needed for RPA assessment documents, it is not sufficient. Because of budget, political, and other reasons, there will be desires to isolate specific activity opportunities and their associated experience opportunities. A more specific experience opportunity based inventory and assessment system will be necessary to meet the need. Also, so that different levels of forest and rangeland planning (national, area guide, forest, and unit) are linked together, it is necessary to develop

different levels of inventory and assessment using the same orientation and basic concepts. The way to insure compatibility among planning levels is to develop both levels and then examine their degree of linkage.

Relationship of Empirical Study to Inventory and Assessment System

The empirical research reported here fits into the inventory and assessment systems just outlined. The research was focused on identifying both desirable and undesirable physical resource attributes associated with primitive and semi-primitive non-motorized outdoor recreation experiences. These types of experiences make up much of what has been labeled dispersed recreation.

With the kind of research done we are in a better position to specify the physical resource attributes necessary to make primitive and semi-primitive non-motorized experiences possible. With the kinds of information produced by the research we can improve our ability to assess resource capability by refining the assessment criteria. The research results are also useful in identifying specific physical resource attributes which might be associated with specific recreation experiences.

More important than the usefulness of the data obtained, the research undertaken has had two other effects. It has led to development of a methodology which seems applicable to identifying physical, social, and managerial attributes. While reliability and validity testing of the methodology needs to be done, initial assessment of the system is positive. The research has also been a catalyst for development of the regional and specific experience inventory and assessment systems outlined. Without the empirical research, these systems would not have been conceptualized.

Research Needs

The research study reported here is a beginning but does not solve the problem of developing a reliable and valid outdoor recreation inventory and assessment system for RPA and other forest and rangeland planning efforts. There are several research efforts which must follow the one just completed.

(1) Replication - in backcountry areas similar to the Indian Peaks it would be desirable to test the scales and methodology developed to determine its reliability. Some of this work is proceeding under cooperative agreement 16-740-CA.

(2) Validation - using a variety of dispersed recreation areas, it would be desirable to test the scales and methodology developed to determine if all relevant resource attributes are being measured.

(3) Experience - Attribute Correlation - for a variety of dispersed recreation areas it is necessary to correlate the experience opportunities preferred with lists of resource attributes to identify resource requirements necessary for the experience opportunities to be used in capability and suitability analyses. Some of this work is proceeding under cooperative agreement 16-740-CA.

(4) Criteria Specification - empirical research needs to be done in order to validly establish physical resource criteria for identification of outdoor recreation opportunities.

(5) Capacity Coefficients - empirical research needs to be done in order to specify capacity coefficients for outdoor recreation experience classes and opportunities.

(6) Social and Managerial Attributes - research similar to that begun for physical resource attributes needs to be done for the other two groups of situational attributes. This includes consumer identification of relevant attributes and specification of criteria for inventory and assessment.

(7) Additional Activities and Areas - the present research has been limited to one area and the activities taking place in that area. The array of activities and areas being studied needs expansion.

(8) Demonstration - the applicability of using the inventory and assessment systems being developed needs to be demonstrated in selected practical situations. On a limited scale one of these demonstrations is proceeding under cooperative agreement 16-740-CA.

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APPENDIX A

(C-1) ID(75-80):_____

Station (1-2):_____ Date(3-6):_____ WD__WE/H__(7) Time(8-11):_____

1. Trip Purpose (12): Rec._____ Non-Rec._____ To-From Rec._____

2. Activity	Part.	Area	Hours				Days			Weeks
			-1	1-3	4-6	7-12	½-1	2-4	5-7	+1
Boating	(13)	(14-17)								(18)
Camping Near Auto	(19)	(20-23)								(24)
Camping Away From Auto	(25)	(26-29)								(30)
Fishing	(31)	(32-35)								(36)
Picnicking	(37)	(38-41)								(42)
Auto Driving	(43)	(44-47)								(48)
4-Wheel Driv.	(49)	(50-53)								(54)
Motorcycling	(55)	(56-59)								(60)
Bicycling	(61)	(62-65)								(66)
Gathering For. Products	(67)	(68-71)								(72)
C-2 Hiking/Walking	(1)	(2-5)								(6)
Technical Mt. Climbing	(7)	(8-11)								(12)
Horseback Riding	(13)	(14-17)								(18)
Hunting	(19)	(20-23)								(24)
Nature Study	(25)	(26-29)								(30)
Other	(31)	(32-35)								(36)

3. Previous visits to this area within past 12 months for any type of recreation (37)

This is first	1	2-3	4-6	7-10	+10

4. Origin of trip within area (38): Yes No

5. Address of Permanent Residence?

(C-3) Name (2-29)_____

(C-4) Street Address (2-35_____

(C-5) City, State, Zip (2-35)_____

(C-2 CONTINUED) THANKS

Type Vehicle (39)*	Σ No. (40-41)	-15		16-20		21-45		+45		Cars Passed (50-51)
		M(42)	F(43)	M(44)	F(45)	M(46)	F(47)	M(48)	F(49)	

*C=car; T=Truck; TR=Trailer; V=Van; CP=Camper; M=Motorhome; MC=Motorcycle; W=4 Wheel Drive; O=Other

Time Start_____ Time Stop_____

NAME OF INTERVIEWER:_____ ID(75-80)_____

APPENDIX B

PERSONAL INTERVIEW

Major Activities Pursued: _____
(circle the major activity)

Years Engaged in the Major Activity:_____

Length of Stay (Hours & Days) So Far_____ Additional Planned_____

Travel Route _____

_____

Two High Points of trip so far (Most satisfying) _____

_____

_____

Low Points of trip (Problems - Dissatisfactions) _____

_____

_____

Perceptions of: Use Levels this visit _____

Total impact of past use_____

Mgmt. Actions (Good & Bad)_____

Mgmt. Recommendations_____

Reasons for visit (type of satisfaction expected and valued; PROBE for specifics)

_____

_____

_____

Specific features of physical setting expected and valued (PROBE for specifics)

_____

_____

_____

_____

Interviewer:_____

OBSERVATIONS

Circle one: Indian Peaks Flat Tops Zone:_____ Section:_____

Date:_____ WD___ WE/H ___ Time:_____

No. of People in Party by Age Group

-15	16-20	21-45	+45	Total
_____	_____	_____	_____	_____

Party composition by sex: No. Males _____ No. Females _____

Mode of travel: (circle) horse hike hike with pack animal

Equipment (Fishing, hunting, cameras, etc.) _____

_____

Violations of Rules & Regulations (open fires; camping within 100 feet of lakes, streams, trails, or other camping parties; cutting live vegetation; litter; dogs off leash; depreciative and undesirable social behavior; firearms; etc.)

Other Observations (General use level at time of interview, weather, etc., use on or off trail, party in transit or set-up, etc.)

APPENDIX C

College of Forestry and Natural Resources
Department of Recreation Resources

Colorado State University
Fort Collins, Colorado
80523

Dear Indian Peaks User:

We appreciated your cooperation with our interviewer this past summer in the Indian Peaks area. Now, we need your help in learning more about recreation experiences in the Indian Peaks. Your impressions and feelings are important to the Forest Service and to us for finding better ways to provide you satisfying experiences.

You were selected as a potential respondent from our 1976 Indian Peaks interview records. Since only a few names were selected, your response is really important. It will probably take you about fifteen minutes to fill out the questionnaire. Then just fold it and return via the postage-paid envelope which is provided. Your answers will be held confidential.

Please complete the questionnaire as soon as possible. Thanks in advance for your time. Your response will help provide better information to develop backcountry policy and management.

Sincerely,

Perry J. Brown
Associate Professor

PJB/cat

enc.

BACKCOUNTRY EXPERIENCE QUESTIONNAIRE

THE FOLLOWING QUESTIONNAIRE IS DESIGNED TO FIND OUT ABOUT BACKCOUNTRY USERS AND THE ASPECTS OF BACKCOUNTRY AREAS WHICH ARE ATTRACTIVE TO THEM. THERE ARE 14 QUESTIONS.

PLEASE ANSWER THE FOLLOWING QUESTIONS BASED ON YOUR EXPERIENCE(S) IN THE INDIAN PEAKS BACKCOUNTRY (west of Boulder, Colorado) DURING THE SUMMER OF 1976.

1. How many visits did you make to the Indian Peaks Backcountry Area this past summer (June - Oct.)? _____ No. of trips

2. How many times did you visit any backcountry or wilderness area during this past summer (June - Oct.)? (Check one)

   /_/ 1 /_/ 4 /_/ 6-10
   /_/ 2 /_/ 5 /_/ 11 or more
   /_/ 3

3. How many people accompanied you on your most recent trip into the Indian Peaks Backcountry?

   _____ No. of people

4. Please check the one category which best describes the members of your party on your most recent trip into the Indian Peaks Backcountry.

   1. /_/ I was alone 3. /_/ friends 5. /_/ a club or organized group
   2. /_/ family 4. /_/ family and friends

5. How many nights, if any, did you spend in the Indian Peaks Backcountry on your most recent trip? (circle)

   0 1 2 3 4 5 6 7 8 9+

6. Please check each of the activities you engaged in when using the Indian Peaks over the entire summer (June - Oct.).

   1. /_/ Camping 5. /_/ Picnicking
   2. /_/ Fishing 6. /_/ Nature Study
   3. /_/ Horseback Riding 7. /_/ Technical Mountain Climbing
   4. /_/ Hiking 8. /_/ Other_____ (please fill in)

7. Which activity among those you checked in question number 6 was the most important to you. (circle)

   1 2 3 4 5 6 7 8

ASPECTS OF THE ENVIRONMENT AFFECTING BACKCOUNTRY EXPERIENCES

8. The items below deal with environmental factors which may affect whether or not you have an enjoyable backcountry recreation experience. Which things in the backcountry affect your satisfaction? Please rate each of the possible characteristics of backcountry areas on how well it adds to (+) or detracts from (-) your satisfaction. Circle only one number for each item.

		ADDS					DETRACTS			
	Effect on Your Satisfaction	Most Strongly	Strongly	Moderately	Slightly	Neither Adds Nor Detracts	Slightly	Moderately	Strongly	Most Strongly
1)	clean fresh air	+4	+3	+2	+1	0	-1	-2	-3	-4
2)	rainy weather	+4	+3	+2	+1	0	-1	-2	-3	-4
3)	wide views of the terrain	+4	+3	+2	+1	0	-1	-2	-3	-4
4)	mule deer	+4	+3	+2	+1	0	-1	-2	-3	-4
5)	large roaring streams	+4	+3	+2	+1	0	-1	-2	-3	-4
6)	meadows among the forest	+4	+3	+2	+1	0	-1	-2	-3	-4
7)	ptarmigan	+4	+3	+2	+1	0	-1	-2	-3	-4
8)	song birds	+4	+3	+2	+1	0	-1	-2	-3	-4
9)	lake views	+4	+3	+2	+1	0	-1	-2	-3	-4
10)	mature virgin forests	+4	+3	+2	+1	0	-1	-2	-3	-4
11)	stocked fish	+4	+3	+2	+1	0	-1	-2	-3	-4
12)	snow capped mountains	+4	+3	+2	+1	0	-1	-2	-3	-4
13)	vast areas with no designated trails	+4	+3	+2	+1	0	-1	-2	-3	-4
14)	alpine meadows	+4	+3	+2	+1	0	-1	-2	-3	-4
15)	elk	+4	+3	+2	+1	0	-1	-2	-3	-4
16)	unusually shaped rocks	+4	+3	+2	+1	0	-1	-2	-3	-4
17)	a variety of different sized streams	+4	+3	+2	+1	0	-1	-2	-3	-4
18)	fossil outcrops	+4	+3	+2	+1	0	-1	-2	-3	-4
19)	naturally reproducing fish populations	+4	+3	+2	+1	0	-1	-2	-3	-4
20)	mountain springs	+4	+3	+2	+1	0	-1	-2	-3	-4
21)	wind sculptured rocks	+4	+3	+2	+1	0	-1	-2	-3	-4
22)	caves	+4	+3	+2	+1	0	-1	-2	-3	-4
23)	brook trout	+4	+3	+2	+1	0	-1	-2	-3	-4
24)	easily obtained firewood	+4	+3	+2	+1	0	-1	-2	-3	-4
25)	rare plants	+4	+3	+2	+1	0	-1	-2	-3	-4

	Effect on Your Satisfaction	ADDS					DETRACTS			
		Most Strongly	Strongly	Moderately	Slightly	Neither Adds Nor Detracts	Slightly	Moderately	Strongly	Most Strongly
26)	scenic overlook	+4	+3	+2	+1	0	-1	-2	-3	-4
27)	brown trout	+4	+3	+2	+1	0	-1	-2	-3	-4
28)	slow moving streams with deep holes	+4	+3	+2	+1	0	-1	-2	-3	-4
29)	rugged terrain	+4	+3	+2	+1	0	-1	-2	-3	-4
30)	beaver dams and ponds	+4	+3	+2	+1	0	-1	-2	-3	-4
31)	snowfields	+4	+3	+2	+1	0	-1	-2	-3	-4
32)	isolated lakes	+4	+3	+2	+1	0	-1	-2	-3	-4
33)	rainbow trout	+4	+3	+2	+1	0	-1	-2	-3	-4
34)	rock towers	+4	+3	+2	+1	0	-1	-2	-3	-4
35)	bears	+4	+3	+2	+1	0	-1	-2	-3	-4
36)	murky or discolored water	+4	+3	+2	+1	0	-1	-2	-3	-4
37)	wildflowers in bloom	+4	+3	+2	+1	0	-1	-2	-3	-4
38)	diverse scenery	+4	+3	+2	+1	0	-1	-2	-3	-4
39)	few evidences of where others have been	+4	+3	+2	+1	0	-1	-2	-3	-4
40)	cutthroat trout	+4	+3	+2	+1	0	-1	-2	-3	-4
41)	insects that bite	+4	+3	+2	+1	0	-1	-2	-3	-4
42)	big horned sheep	+4	+3	+2	+1	0	-1	-2	-3	-4
43)	hot springs	+4	+3	+2	+1	0	-1	-2	-3	-4
44)	grayling	+4	+3	+2	+1	0	-1	-2	-3	-4
45)	small streams you can step across	+4	+3	+2	+1	0	-1	-2	-3	-4
46)	boulder fields	+4	+3	+2	+1	0	-1	-2	-3	-4
47)	steep terrain areas	+4	+3	+2	+1	0	-1	-2	-3	-4
48)	areas above timberline	+4	+3	+2	+1	0	-1	-2	-3	-4
49)	Indian artifacts	+4	+3	+2	+1	0	-1	-2	-3	-4
50)	steep gorges	+4	+3	+2	+1	0	-1	-2	-3	-4
51)	glaciers	+4	+3	+2	+1	0	-1	-2	-3	-4
52)	squirrels	+4	+3	+2	+1	0	-1	-2	-3	-4
53)	grouse	+4	+3	+2	+1	0	-1	-2	-3	-4
54)	hikeable ridgetops	+4	+3	+2	+1	0	-1	-2	-3	-4
55)	aspen groves	+4	+3	+2	+1	0	-1	-2	-3	-4

	Effect on Your Satisfaction	ADDS: Most Strongly	Strongly	Moderately	Slightly	Neither Adds Nor Detracts	DETRACTS: Slightly	Moderately	Strongly	Most Strongly
56)	evidence of logging activity	+4	+3	+2	+1	0	-1	-2	-3	-4
57)	waterfalls	+4	+3	+2	+1	0	-1	-2	-3	-4
58)	a variety of rock types and minerals	+4	+3	+2	+1	0	-1	-2	-3	-4
59)	abundant sources of water	+4	+3	+2	+1	0	-1	-2	-3	-4
60)	dense stands of pines	+4	+3	+2	+1	0	-1	-2	-3	-4
61)	drinkable mountain water	+4	+3	+2	+1	0	-1	-2	-3	-4
62)	evidence of mining activity	+4	+3	+2	+1	0	-1	-2	-3	-4
63)	areas with dense vegetation	+4	+3	+2	+1	0	-1	-2	-3	-4
64)	small furbearers	+4	+3	+2	+1	0	-1	-2	-3	-4
65)	streams with many fly hatches	+4	+3	+2	+1	0	-1	-2	-3	-4
66)	marshes	+4	+3	+2	+1	0	-1	-2	-3	-4
67)	steep terrain	+4	+3	+2	+1	0	-1	-2	-3	-4
68)	streams lined with brush	+4	+3	+2	+1	0	-1	-2	-3	-4
69)	predatory birds such as owls and hawks	+4	+3	+2	+1	0	-1	-2	-3	-4
70)	reservoirs in the backcountry	+4	+3	+2	+1	0	-1	-2	-3	-4
71)	rock outcroppings	+4	+3	+2	+1	0	-1	-2	-3	-4
72)	shaded areas without underbrush	+4	+3	+2	+1	0	-1	-2	-3	-4
73)	columbines	+4	+3	+2	+1	0	-1	-2	-3	-4

USERS PROFILE QUESTIONS

The following questions are about you. Please remember in answering questions 9 through 14 that your answers will be confidential. Your name will not be associated with your answers.

9. Please enter the zip code of your home residence. _ _ _ _ _

10. Your sex? 1. /_/ female 2. /_/ male

11. Your age at your last birthday? _____ years

12. Family life cycle? 1. /_/ single 2. /_/ married

If you have any children, how many do you have? _____ No.

If you have any children, check one:

1. /_/ All children under 12 years old
2. /_/ Some children under 12 years old
3. /_/ All children over 12 years, living at home
4. /_/ All children over 12 years, some living at home
5. /_/ All children away

13. Population of community where you now live?

1. /_/ 100,000 or more
2. /_/ 25,000 - 100,000
3. /_/ 5,000 - 25,000
4. /_/ below 5,000
5. /_/ farm

14. What is the highest year of formal schooling you have completed? (circle one)

Elementary	1	2	3	4	5	6	7	8
High school or vocational school	9	10	11	12				
College or technical school	13	14	15	16				
Post graduate school	17	18	19	20	21	22		

Thank you for your cooperation. Please return the questionnaire in the self-addressed stamped envelope provided.

Perry J. Brown
Associate Professor
Recreation Resources
Colorado State University
Fort Collins, Colorado 80523

APPENDIX D

CLUSTER STATISTICS

CLUSTER	VARIABLES	OBLIQUE FACTOR COEFFICIENT	COMMUNALITY	AVERAGE R WITH OTHER VARIABLES
FISH RELATED	27	0.9160	0.8809	0.6888
	33	0.9036	0.8284	0.6795
	23	0.8893	0.8184	0.6687
	40	0.8769	0.7993	0.6594
	19	0.7009	0.5427	0.5271
	11	0.6253	0.5229	0.4702
	28	0.5914	0.4584	0.4447
	44	0.5126	0.3473	0.3855
RUGGED TOPOGRAPHY	47	0.8883	0.8187	0.6815
	67	0.8406	0.7726	0.6450
	50	0.7959	0.6510	0.6107
	48	0.7746	0.6377	0.5943
	46	0.7504	0.5934	0.5757
	29	0.7191	0.5475	0.5517
	31	0.6898	0.5096	0.5292
	51	0.6792	0.5522	0.5211
INTRUSIONS	56	0.8906	0.8109	0.6251
	62	0.7422	0.5840	0.5210
	70	0.4728	0.2862	0.3319
WILDLIFE	4	0.7631	0.6678	0.5052
	53	0.7357	0.5525	0.4871
	64	0.7317	0.5872	0.4844
	42	0.6922	0.5346	0.4583
	15	0.6675	0.4871	0.4419
	69	0.6551	0.5464	0.4337
	52	0.5854	0.4140	0.3876
	8	0.5761	0.4318	0.3814
	7	0.5519	0.3646	0.3654
WATER RELATED	20	0.7432	0.5812	0.4882
	57	0.7355	0.5895	0.4832
	59	0.6773	0.4865	0.4449
	17	0.6768	0.5395	0.4446
	9	0.6236	0.4292	0.4097
	45	0.6216	0.4343	0.4083
	5	0.5207	0.3085	0.3420